MURINE NOROVIRUS

CLASSIFICATION

Family: Caliciviridae
Genus: Norovirus

- Non-enveloped RNA virus
- Linear, positive – sense, single – stranded
- 7.4 kb genome
- ~ 27-32 nm diameter
- Replicates in macrophages and dendritic cells

PREVALENCE

There is a suggestion that MNV has in fact been present in mice for many years, but not recognized. The fact that there is a lack of visible effects of MNV suggests that the virus has become well adapted to its mouse host. Data collection at ComPath from July 2007 to June 2008 found that approximately 42% of all mouse sera sent in showed reactivity to MNV. This percentage of MNV positive mouse serum sent to ComPath dropped to approximately 17% in the period July 2013 to June 2014.

DIAGNOSIS

ELISA, IFA, RT-PCR

DISEASE/CLINICAL SIGNS

Norovirus infects the gastrointestinal tract of several mammalian species. At this stage it is believed that disease manifestations of MNV-1 infections are only evidenced in a few mouse strains (2):

Immunodeficient (RAG/STAT -/-) mice - high mortality with concomitant encephalitis, meningitis, vasculitis, pneumonia and hepatitis
RAG -/- mice - low mortality but maintain persistent infection
Immunocompetent mice – seroconversion but only transient infection
Interferon-αβγ receptor -/- mice were 10,000 fold more susceptible than immunocompetent mice

STRAINS

Currently 4 strains of MNV have been isolated – MNV-1, MNV-2, MNV-3 and MNV-4. All strains are serologically cross-reactive, and may be detected with the same primer set in RT-PCR.

Immunocompetent mice experimentally infected with strains MNV-2, MNV-3 and MNV-4 shed the virus in faeces for up to 8 weeks, suggesting that MNV can cause persistent infection in mice. However, immunocompetent mice experimentally inoculated with MNV-1 appeared to have a very brief shedding period

(up to 7 days post infection), and persistent infection could not be demonstrated as the virus was not detectable in mesenteric lymph nodes 5 weeks post infection. In contrast, strains MNV-2, MNV-3 and MNV-4 could be detected in mesenteric lymph nodes up to 8 weeks post infection.

TRANSMISSION

MNV is transmitted via the oral-faecal route and can be efficiently transferred to sentinel mice by soiled bedding.

INTERFERENCE WITH RESEARCH

The effects of MNV on research are not fully documented at this stage. Nelson et al 2013 reports that MNV does not significantly alter intestinal microbiota in wildtype mice. Histological changes noted in immunocompetent mice include:

- An increase in inflammatory cells in the small intestine
- Red pulp hypertrophy in the spleen

Due to replication of the virus in macrophages and dendritic cells, it is possible that MNV may interfere with function research of these cells. It has also been demonstrated that interferons are needed for host resistance to MNV, so interferon pathway dependant research may also be affected.

DURABILITY

Sensitive to:

- Lipid solvents
- Ether

CONTROL

Maintain regular health monitoring of supplier sub-populations and strict protocols for barrier colonies. Exclusion of wild mice from facility. Extreme care to be taken by testing transplantable tumour and cell lines before use.

POST INFECTION

The most effective way to eliminate MNV is to cull all infected animals and obtain clean replacement stock.

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